3. SYSTEMS-RELATED ARCHITECTURE

a. Structural/Seismic Systems

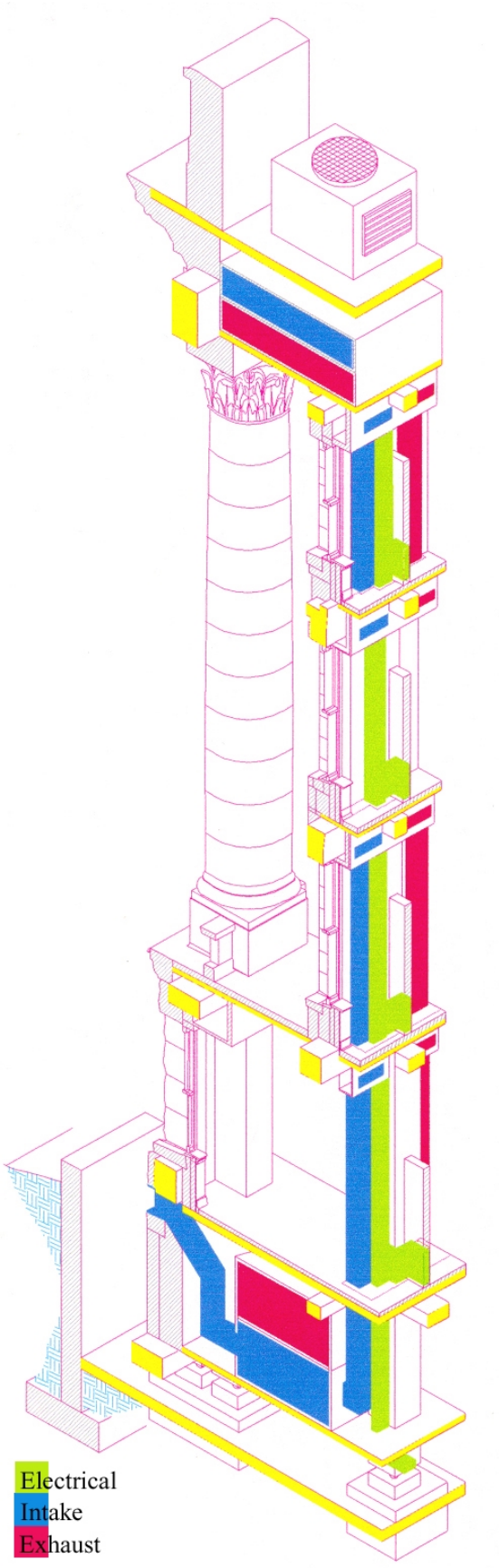
Structural engineers have determined that the best way to make the Capitol seismic-resistant while reducing the amount of deformation or movement in an earthquake (thus minimizing non-structural damage and preserving a maximum amount of ornament), is to install a combination base isolation-shear wall system. The base isolators will be placed beneath each of the existing concrete posts and walls slightly above or below the level of the current basement floor. The tops of the existing pyramidal and square block footings will be removed. The ramification for the basement is that the basic floor plan and amount of usable space will remain intact. The basement will actually pick up a small amount of square footage due to the removal of the tops of the existing concrete footings. Since the basement is not an area of architectural significance, the structural changes made in and under the basement level will be of little architectural consequence.

Every effort has been made in this pre-design analysis and recommendations phase to propose solutions which meet the structural design criteria while minimizing the amount of alteration done to the character-defining spaces and features of the interior. The new shear walls will run floor-to-ceiling on each floor. They will be approximately the same thickness as the existing concrete post to which they will be attached (see the drawings in section XI., Structural/Seismic Systems). The drag struts are new, larger, reinforced concrete beams which will be built around some of the existing beams.

Most of the shear walls and drag struts have been proposed for areas where the architectural impact will be insignificant or minimal. However, the structurally required locations of certain shear walls and drag struts, as presently conceived, will impact some of the architecturally significant walls and features. This is especially true of the Gold Room. Although a vast improvement on previous shear wall proposals in terms of preservation, the current layout calls for a shear wall and drag strut in the location of the west wall of the Gold Room, plus a short shear wall on the north wall at the northwest corner, and a drag strut only across the west half of the Gold Room. This would entail removal of these sections of the Gold Room to install the new reinforced concrete shear walls and drag struts. If this is found, upon more detailed design engineering, to be necessary, the architectural material would be removed, stored, and reinstalled after the structural work is completed.

As a preservation option, it may be possible, however, to place the needed shear walls and drag struts in the next post line to the west, in what is now a staff office section of the executive suite. This change may be slightly less desirable from an engineering perspective, but it would save the Gold Room from significant alteration. We recommend that future engineering work focus on a solution which succeeds structurally but also saves the Gold Room to the maximum extent possible.

Most of the other 20 shear walls and 26 drag struts per floor can be installed in areas of little architectural significance, or areas where the architecture has already removed or been adversely altered. The other exception would be the walls and struts that impact the grand rotunda/atrium area. As presently calculated, this would occur identically in four areas–the northwest, northeast, southwest and southeast, east-to-west marble walls of the Main Floor. To install the shear walls and struts, the marble wall sheathing will need to be temporarily removed, stored and then reinstalled later. We have provided



some recommendations on how this may be done in the following section 4., Materials Salvage and Reinstallation. In each of the fours areas , the length of wall affected is 40 feet. The same shear walls above affect plastered walls which are more easily restored. Again, more refined engineering design may develop shear wall locations which save even more of the original material than presently planned.

b. Mechanical Systems

The new heating and cooling system is planned to deliver air through the same vertical chases in the exterior and thickened interior walls as existed originally and remain today. Where new interior chases are needed, they will be installed in the thickened walls where they will not impact historic architecture. New grills and registers will replicate the designs of the existing brass units.

Plumbing exists in only a places in the Capitol as most of the numerous small, private toilet rooms that existed originally have been removed, leaving only the large, public rest rooms. The piping for these rooms will be replaced in the same concealed locations it exists now. Any repair or replacement of historic flooring, walls, ceilings, cabinets, toilet partitions, cabinets, accessories, hardware or plumbing fixtures will be done with sensitivity to preserving the original character of the architecture.

c. Electrical Systems

In addition to electrical panels, conduit, wiring and controls for lighting and outlets, electrical systems will provide for security, communications, telephone, computers, etc. The new wiring from the basement electrical rooms will extend vertically to all floors through chases provided in the outside walls next to those that presently exist for heating and cooling. The new chases will be small enough so as not to require the widening or furring out of the perimeter walls. This will preserve any existing walls of importance, such as south wall of the Gold Room. Should it be necessary to access chases behind historic walls, the approach will be to enter through the outside by removing and temporarily pinning in place the veneer stone.

Horizontal wiring will be channeled into the softer, existing 3" thick cement “asbesticite” floor topping that now lies entirely hidden by newer flooring such as carpeting. Holes will be drills through floors from above to access ceiling lights. This will

protect historic ceilings from unnecessary damage. Access to outlet and switches in walls will be though existing or newly created wall chases. Some of the present hollow clay tiles walls, for example, will be replaced by steel stud walls which have cavities through which wired conduit may be run. Any channeling through historic plaster walls and ceilings will be repaired and refinished to match the original appearance.

Some surface-mounted communications and security apparatus now exist in the building, including electric signs, speakers and cameras. To the largest extent possible, these should be concealed or mounted where they are less obtrusive.

VIEW UP PILASTER, GROUND FLOOR UNDER CONSTRUCTION

4. ELEVATION SURVEY OF SETTLING

To determine how much the Capitol building has settled, surveyors took spot elevations with a transit in a variety of locations throughout the Ground Level and Main Level. Approximately 77 elevations were taken on the Ground Level and about 67 elevations on the Main Level. The elevations were shot in every quadrant of the building as well as through the rotunda area and at all four major entries. The control or reference point was the center of the rotunda which was given an assumed elevation of 0'-0" on each floor. The actual elevation of this point is 4537.39' above sea level for the Ground Level and 4553.33' for the Main Level.

Two types of information are analyzed herein: 1) The amount of floor level difference between various wings or sections of the two levels with respect to the central reference point, and, 2) The amount of floor level difference within a given wing or area. The word "settlement" as used herein may refer to actual settlement or it may refer to a difference in comparative floor levels, for whatever reason the difference exists. For example, there may a difference of one inch in the spot elevations taken in two areas over 200 feet apart in, say, the west wing. Whether this difference is due to actual settlement or was the result of a very slightly uneven original construction, is not known. The identification of the 144 spot elevations was done with the purpose if discovering any differences significant enough to possibly signify actual settlement , deflection or structural failure. As our results show, we found no significant differences. The largest difference occurs in the rotunda area which has settled slightly with resect to the rest of the building.

The results of the surveying may be summarized as follows:

Ground Floor:

* West Side: The floor level ranges from of 1/8" above the central 0'-0" point at the west entry to a maximum of 1-11/16" above the center point at the base of the northwest stairway. Given the 202-3-1/2" length of this section of the building, the .00005 amount of floor level difference or "settlement" suggests no significant structural failure. All of the "settlement" figures in this area are higher than the floor at the center of the rotunda because the heavier rotunda area has settled slightly with respect the rest of the building.

* North Side: The settlement in the north wing ranges from ½" to 2-1/4" above the center point, the latter of which occurs in two places. Given the 118' length of this section of the building, the .0012 amount of settlement difference is slightly more severe than in the western quadrant but still not structurally significant.

East Side: The settlement ranges from 7/8" to a high of 3-3/16" above the center point at a post in the northwest section of this quadrant. The average settlement difference of the east wing is .0001. With respect to the 0'-0" central reference point, the maximum floor level difference of 3-3/16" is .0013 of the 202'-3-1/2" length of this area. Again, the eastern area is higher than the center point due to the slight settlement of the rotunda area.

South Side: Settlement in the short projection constituting the main entry ranges from ½" to a maximum of 1-5/16" above the center point, or .0007 of the 93.5' length of this area. On the average, the floor in this

wing is about an inch higher than the center of the rotunda.

Rotunda: The floor has settled 1/8" at the northwest post and 3/16" at the southwest post. Conversely, the southeast post is 1/8" higher and the northeast post 3/16" higher than the center. These differences are not statistically significant. Given that the floors of all fours wings are slightly higher than the center point, it likely that the 0'-0" center point is 1-2" lower than it was when first built. However, given that the overall difference of from plus 1/8" at the west entry to plus 1-13/16" at the east entry equals a difference of only 1.69," the overall settlement of .00035 across the entire east-to-west length of the building is insignificant, if not remarkably encouraging structurally.

Main Level:

West Side: The floor ranges from level in the Gold Room to a maximum of 2-1/2" higher than the 0'-0" center point in the middle of the north wall. This maximum difference is .001 above the center point is roughly half due to the average of 1" settlement of the four rotunda supports. The other half is due to the very slight settlement or floor level difference of the south portion of the west wing with respect to the north portion.

North Side: The north projecting wing ranges from 2" to a maximum of 3-5/16" above the central 0'-0" point. The settlement difference within the area is 1.3125" or .0009. The difference from the center point is .0023, the highest percentage found in the building, yet still not structurally consequential.

East Side: Due to the largely to the settlement of the rotunda area, the east wing averages 2.5 to 3" above the floor level of the center point. The maximum is 3-5/16" near the northeast corner of the building. This area is thus .0014 above the center point. The difference in floor area throughout the east wing, however, is only 1.25" or .0005.

South Side: The landing of the colonnade measured at the base of the columns south of the south entry ranges from 15/16" to 1-7/8" below the level of the floor at the center point of the rotunda. This area outside of the building has settled an amount slightly greater than that of the adjacent building. Once inside the front entry, the slightly projecting south wing is up to 2-1/16" higher than the center point, for a difference of .0018. None of these amounts signifies significant structural difficulties.

Rotunda: The 0'-0" center point of the Main Floor of the rotunda is ½" lower than the southwest structural support and up to 1/5/16" lower than the southeastern support. The northeastern and northwestern supports average an inch higher. We attribute the difference to changes made to the center of the rotunda floor which once had a "skylight"consisting of translucent glass blocks supported by radial beams emanating from the center point of the floor. When the top of the glass blocks were removed and replaced with the present green terrazo, the additional weight may have caused the radial beams to settled slightly. Or, the beams may have deflected as part of the overall settling of the larger rotunda structure, but at a slightly higher rate. Whichever, the amount of settlement between the center of the floor and the four dome supports remains slight, amounting to .0055 in the worst condition between the center of the floor and the northwest corner of the southeast support element.

In summary, the rotunda area, and the center floor area in particular, have settled slightly with respect to the

rest of the building. The floors in all four quadrants are slightly higher than in the center of the building. The front portico landing has settled separately and slightly more than the main building, although not significantly more. The east wing is slightly higher than the others, but almost imperceptively so.

The settlement difference of .00035 across the entire east-to-west length of the Ground Floor level of the building (or .00055 across this length on the Main Floor), and the similar .00051 north-to-south difference (on the Main Floor level) suggest that settlement in the Capitol has been extremely limited and experienced primarily to the rotunda area. The lack of serious settlement, given the length of the building and the presence of nearby earthquake fault lines, suggests that the building was well engineered and built for its time. The lack of settlement problems, however, does not reflect on other structural problems which may effect other aspects of the structural system. The reader is referred to the structural engineering section for a more comprehensive discussion of structural and seismic issues.

5. BUILDING HEIGHT

The following building heights were taken during the survey of the building and preparation of elevation drawings.

Elevation Heights

First (basement) level floor to ceiling	8'-11"
First level floor to Second level floor	9'-8"
Second level floor thickness	0'-9"
Second level floor to ceiling	14'-3-1/2"
Second level floor to Third level floor	16'-0"
Third level floor thickness	1'-8-1/2"
Third level floor to ceiling	13'-7-1/2"
Third level floor to Fourth level floor	15'-4"
Fourth level floor thickness	1'-8-1/2"
Fourth level floor to ceiling	12'-10-1/2"
Fourth level floor to Fifth level floor	14'-6"
Fifth level floor thickness	1'-7-1/2"
Fifth floor to ceiling at vault	25'-5-3/4"
Fifth floor to ceiling at galleries	12'-0-1/2"

Grade to top of parapet balustrade, SW corner	79'-8"
Roof surface to top of lantern and finial (approximate)	178'-3"
Exterior stair platform to top of lantern and finial (scaled from drawing)	132'
Rotunda floor to rotunda ceiling	158'-10"
Rotunda ceiling to dome top (interdome area)	40'-2"
Grade to top of lantern and finial (approximate)	248'-8"

* all measurements were taken on site with a laser or a tape measure unless noted otherwise